34006/VGG/J104

CLAIMS

1. A sputtering target assembly comprising a high purity copper target, a precipitation hardened aluminum alloy backing plate and an intermediate layer of CuCr diffusion bonded to the target and backing plate.

2. A sputtering target assembly according to claim 1 wherein the backing plate is in the fully hard T6 condition.

3. A sputtering target assembly according to claim 1 wherein the high purity copper target comprises copper of a purity of at least about 99.999 wt.%.

4. A sputtering target assembly according to claim 1 wherein the high purity copper target comprises copper of a purity of at least about 99.995 wt.%.

5. A sputtering target assembly according to claim 3 wherein the sputtering target contains a micro-alloy grain stabilizer comprising at least one of Ag, Sn, Te, In, Mg, B, Bi, Sb, and P.

6. A sputtering target assembly according to claim 4 wherein said micro-alloy grain stabilizer is present in an amount of about 0.3 ppm to 10 ppm.

7. A sputtering target assembly according to claim 5 wherein said micro-alloy grain stabilizer comprises Ag.

8. A sputtering target assembly according to claim 1 wherein said intermediate layer comprises copper and about 0.5 to 1.5 wt.% Cr.

9. A sputtering target assembly according to claim 1 wherein the copper target has substantially uniform grain size comprising not more than about 50 μm.

10. A method of making a sputtering target assembly comprising:

a) providing high purity copper target of at least about 99.999 wt.% purity;

b) preparing a master alloy of copper and not more than about 10 ppm of at least one of Ag, Sn, Te, In, Mg, B, Bi, Sb, and P;

c) preparing a molten combination of copper and master alloy and solidify the molten combination to produce a cast billet;

d) hot deforming the cast billet for a total of at least about 50% deformation on each axis and then rapidly quenching the deformed billet, preferably in water;

e) frictionless forging the quenched billet at elevated temperature to about 70% of the starting length of the billet and rapidly quenching, preferably in water;

f) cold rolling to a total of about 90% deformation;

g) providing an aluminum alloy backing plate having a precladding surface of CuCr diffusion bonded thereto;

h) diffusion bonding said high purity copper target to the preclad CuCr surface; and

i) precipitation hardening the aluminum alloy backing plate to the fully hard T6 condition.

11. A method according to claim 9 wherein said master alloy is prepared by combining a major amount of high purity copper with a minor amount of at least one of Ag, Sn, Ti, In, Mg,

B, Bi, Sb and P, melting the combination and casting to produce a master alloy.

12. A method according to claim 10 wherein high purity copper is combined with at least one of Ag, Sn, Ti, In, Mg, B, Bi, Sb and/or P in a ratio of about 1000 to 1.

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13. A method according to claim 9 wherein the aluminum alloy backing plate having a precladding surface of CuCr diffusion bonded thereto is used which is produced by a process comprising embedding an alloy of Cu and Cr in an aluminum or aluminum alloy envelope and e-beam welding the envelope closed in a vacuum environment; heat treating the enclosed envelope and forging to bring the CuCr into intimate contact with the aluminum alloy to be used as a backing plate, quenching removing the aluminum alloy envelope to expose the CuCr surface and precipitation harden the aluminum alloy to full hard T6 condition.

14. An interconnect for use in an integrated circuit, having a width of about 0.18 µm or less comprising at least 99.999% copper and a micro-alloy stabilizer of at lest one of Ag, Sn, Tr, In, Mg, B, Bi, Sb and/or P.

15. An interconnect for use in an integrated circuit according to claim 13 comprising at least 99.9999% purity.

16. An interconnect according to claim 14 wherein the amount of micro-alloy stabilizer is about 0.3 to 10 ppm.

17. An interconnect according to claim 15 wherein the amount of micro-alloy stabilizer is about 0.3 to 10 ppm.

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